- Meeting rooms:
 - Main room: Zuni South
 - 2nd room: Chaco West for afternoon
- Breakfast: 8:00-9:00AM
- Group dinner tonight at 6PM (Cesar)
 - Pink Adobe
- Local contact/help:
 - 505-412-7396 (Ming)
 - 631-384-4381 (Cesar)

Welcome to Santa Fe

Photo by Haiwang Yu

MVTX Status and Plan

MVTX & HF-Jet Workfest, Santa Fe 12/5-7, 2017

Ming, Maria, Bob, Grazyna, Jin and Xin

Outline

- MVTX update since July Director's Review
 - Physics and Simulations
 - Readout and Controls
 - Mechanical System
 - Budget and Schedule
- Plan for the rest of the week

New sPHENIX baseline and MVTX Plan

- New sPHENIX baseline schedule
 - CD-1 Review: 5/2018
 - sPHENIX installation
 - 4/2021 7/2022
 - sPHENIX ready for beam: 9/2022
 - First collision: 1/2023
- New/reduced sPHENIX baseline detectors
 - EMCal: |eta| < 0.85 (1.1)
 - OHCal: |eta| < 1? (1.1)
 - IHCal: not available (1.1)

- MVTX plan align with the new sPHENIX schedule
 - Stave production
 - Following ALICE production: ~8/2018
 - Readout units production
 - Be part of ALICE RU production:
 - FPGA & GTB chipset
 - Ready for installation: later 2021
 - INTT ready for installation 4/2021
 - MVTX ready for beam
 - sPHENIX day-1

Performance Update

• Fully implemented MVTX models used in performance projection



- Large jets production in full detectors, including detailed MVTX detector + full calorimetry
 - 250k MB jets in p+p collisions
 - 100k MB jet embedded into central Au+Au collisions

Updated *p*+*p* and Au+Au *b*-jet Projections

- *b*-jet tagging projection re-evaluated with full tracking + calorimetry simulation
 - Tagging work point has been stable (60% Purity 40% eff for pp)
 - Central Au+Au Tagging work point has been stable (40% Purity 40% eff)
- Performance has been stable using truth jet finding or calorimetry reconstructed jet finding



Theoretical Inputs – in Progress

- LANL model
- Duke model
- TAMU
- AMPT
- PHSD
- Ads/CFT
- JetScape

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New calculations from PHSD



Sho's talk

MVTX Readout and Controls



Excellent Progress in Detector R&D

- ALPIDE Evaluation and optimization
 - MOSAIC + Single Chip/Stave
 - Laser system
- Power unit tested
 - PU + MOSAIC
 - PU + RU
- Full readout chain demonstrated
 - ALPIDE + RUv1.0 + FELIX v1.5 + RCDAQ
 - Full stave + RUv1.x + FELIX v2.0 + RCDAQ

- Telescope under development
 - Mechanical frame
 - GEANT simulation
 - Alignment & tracking
 - Cooling



LDRD – MVTX/sPHENIX Key Tasks/Milestones



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Mechanical System & Integration

• MVTX Design

• Extended CYSS

• MVTX+INTT+TPC





sPHENIX cross-section view, including envelope for services; TPC and INTT



Budget and Schedule – in Progress

- Total budget: 6.5M
 - Production
 - Assembly
 - Integration



Cost + Contingency + Pass Through

Major Items	Cost (\$M)	Schedule
Staves (WBS 1.5.3.1)	1.4	8/2018-5/2019
Readout & Controls (WBS 1.5.2)	1.3	1/2019-6/2019
Mechanics & Detector Assembly (WBS 1.5.3)	1.8	2019-2022, TBD
Integration (WBS 1.5.4)	1.0	2021-2022, TBD
Project Management	1.0	8/2018-1/2023

Dave's talk

Plan for the Workfest

Writing, Writing and Writing To update the full proposal document

Chris has assigned 9 powerful interactive machine for this workfest (40 Core/80 GB memory), no time limit. Valid for use until Dec 12.

These interactive RCF nodes are: rcas2901-2904 and rcas2906-2910

Agenda

- Day-1: (12/5, Tue.)
 - Review current draft by WG TLs
 - Identify and discuss areas for improvements
 - Working sessions in the afternoon: working groups
- Day-2:
 - Discuss updates from day-1 by WG TLs
 - Working sessions in the afternoon: working groups
- Day-3:
 - Discuss updates from day-2
 - Finalize a preliminary full proposal

Workfest Indico Page: https://indico.bnl.gov/conferenceModification.py?confld=3557

4 working groups with team leaders:

- Physics & simulations
- Electronics & sensors
- Mechanical system
- Cost, Schedule & Risks

Two rooms available

- Zuni South
- Chaco West

4 Working Groups

To complete the draft by the end of this workshop

• Physics and Simulations

• HF-Jet TG, Jin, Xin, Tony, Sanghoon, Haiwang, Darren, Xiaolong, SukHyun, Cesar, Ming et al

• Staves, electronics & power system

- Readout Mark, Sho, AlexT, Jo, Kun, Ming, Giacomo, Kai/BNL/ATLAS, Jin/BNL, Martin, JohnH ...
- Staves/Sensors- Cesar, Xuan, Maria, Ming ...

Mechanical system & Integration

- Integration Bob, Grazyna, Walt, Jim K., Giacomo, Chris ...
- Carbon structures Grazyna
- Project Cost, Schedule, Risks
 - Dave, Ming, Maria, Bob, Grazyna, Giacomo, Jo, ...

* Working group team leaders



A Monolithic Active Pixel Sensor Detector for the sPHENIX Experiment

Backup

Day 1: 12/5

- 8:00-9:00 Breakfast
- 9:00-9:10: Workshop Goals (Ming, Maria)
- 9:10 9:30: sPHENIX plan (Ed, Maria)
- 9:30 9:50 MVTX Overview (Maria, Ming)
- 9:50-10:20 Status Report 30': Science and Simulations (Jin/Xin)
- •
- 10:20-10:40 coffee break 20'
- •
- 10:40 11:10: Status Report 30': Readout (Mark, Sho)
- 11:10-11:30: Status Report 30': Mechanical system (Bob, Walt, Grazyna)
- 11:30-12:00: Status Report 30': Cost and Schedule (Dave, Maria)
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- Lunch break: 12:00-1:30
- 1:30-2:00 INTT/MVTX integration Mickey Chiu
- 2:00-2:30 sPHENIX Readout integration discussions (Ed Desmond, Martin, John)
- 2:30 5:30 Working sessions, 4 groups
- •
- 3:30-4:00 Coffee break
- •
- group dinner @6:00PM in Santa Fe

Chair: Cesar

Chair: Jin

Chair: Maria

Day-2

- 8:00-9:00 Breakfast
- 9:00-9:20: Progress report and discussion 20': Physics and Simulations
- 9:20-9:40: Progress report and discussion 20': Readout
- 9:40-10:00: Progress report and discussion20': Mechanical system
- 10:00- 10:20: Progress report and discussion20': Cost and Schedules
- 10:20-11:00: coffee break
- ٠
- 11:00- 11:30: Physics presentation by Haitao Li/Ivan Vitev
 - title:
 - Inverting the mass hierarchy of jet quenching with b-jet substructure

abstract:

- The two-prong substructure of the leading subjets inside a reconstructed jet opens new windows on precision constraints on the in-medium modification of parton showers. We present the first resumed calculation of the groomed soft dropped subjet momentum sharing distribution in heavy ion collisions, and demonstrate that both the STAR data at RHIC and the CMS results can be understood in the unified framework of soft-collinear effective theory with Glauber gluon interactions. Recent advances in understanding mass effects on the QCD splitting functions enables us to apply this method for the first time to heavy flavor tagged jets. We find that in the kinematic region that will be accessed by sPHENIX in the future there is a unique reversal of the mass hierarchy of jet quenching effects. Namely, the momentum sharing distribution of b-tagged jets is more strongly modified in comparison to the one for light jets.
- Lunch break: 12:00-1:30
- ٠
- 1:30 5:30 Working sessions, 4 groups
- 3:30-4:00 Coffee break

Chair - Bob

Chair - Xin

Day-3 (half-day?)

- 8:00-9:00 Breakfast
- •
- 9:00- 9:20: Progress report and discussion 20': Physics and Simulations
- 9:20- 9:40: Progress report and discussion 20': Readout
- 9:40-10:00: Progress report and discussion 20': Mechanical system
- 10:00- 10:20: Progress report and discussion 20': Cost and Schedules
- •
- 10:20-11:00: coffee break
- •
- 11:00 12:00: sPHENIX MVTX plan general discussions, full proposal submission etc all Chair Ming
 - full proposal submission to DOE, 1/15/2018(Monday)?
- Lunch break: 12:00-1:30
- •
- 1:30 5:00 Working sessions, 4 groups
- •
- 3:30-4:00 Coffee break

b-jet v2 projection

- From the MVTX Director's review, we were also recommended to make projection for b-jet v2
- In mid-central events, probing path-length dependent energy loss for b-quark



Performance stu update since July r



- Fully implemented MVTX models used in performance projection
- Large jets production in full detectors, including detailed MVTX detector + full calorimetry
 - 250k MB jets in p+p collisions
 - Macros modifications: https://github.com/sPHENIX-Collaboration/macros/compare/master...blackcathj:HF-production-bjetpp200?expand=1
 - Final sample available: /sphenix/data/data02/HF-production-bjet-pp200/pythia8/
 - 100k MB jet embedded into central Au+Au collisions
 - Production file location: /sphenix/data/data02/HF-production-bjet-AuAu200/pythia8
 - Example analysis macro is on this branch: <u>https://github.com/blackcathj/macros/tree/HF-production-bjet-AuAu200-readback</u>

Updated *p*+*p* and Au+Au *b*-jet ProjectionS

- *b*-jet tagging projection reevaluated with full tracking + calorimetry simulation
 - Tagging work point has been stable (60% Purity 40% eff)
- Performance has been stable using truth jet finding or calorimetry reconstructed jet finding



Updated central Au+Au *b*-jet tagging

- Track counting tagging: Haiwang reevaluated with full tracking + calorimetry simulation of p+p jets embedded in central Au+Au
 - Central Au+Au Tagging work point has been stable (40% Purity 40% eff)
- Toolsets prepared to update the secondary vertex tagging too
 - <u>https://github.com/sPHENIX-Collaboration/coresoftware/pull/386</u>



MVTX Readout Electronics



Extended inner tracker with current outer composite shell



12/4/17

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Section view of sPHENIX inner detector assembly the ALICE service barrel has been modified – shortened





ALICE HALF-BARREL ASSY

First INTT Drawing from Don Cacace

